

CLAIMS

## WHAT IS CLAIMED IS:

1. A golf ball having a cover, wherein the cover has a scuff resistance no greater than about 3.0 out of 5 and wherein the cover comprises a thermoplastic composition that includes:
- 5 (a) at least one E/X/Y copolymer having a weight average molecular weight ( $M_w$ ) of from about 80,000 to about 500,000 obtained by the copolymerization of comonomers E, X, and Y wherein E is ethylene, X is a  $C_3$  to  $C_8$   $\alpha,\beta$ -ethylenically
- 10 unsaturated carboxylic acid, and Y is an alkyl acrylate or an alkyl methacrylate softening comonomer wherein the alkyl groups have from 1 to 8 carbon atoms, wherein X is present in an amount of from about 2 to about 30 wt.% of the E/X/Y copolymer, Y is present in an amount of from about 17 to about
- 15 40 wt.% of the E/X/Y copolymer;
- (b) one or more E/acrylic acid and/or E/methacrylic acid copolymers having a weight average molecular weight of from about 2,000 to about 30,000 and having from about 3 to about 20 wt.% acrylic acid and/or methacrylic acid present based on the weight
- 20 of (b), the copolymer present in the composition in an amount of from about 5 to about 30 wt.% based on the combined weight of (a)+(b);
- and wherein: (1) the thermoplastic composition is at least partially neutralized by one or more alkali metal, transition metal, or alkaline earth
- 25 metal ionic compounds; and (2) the composition has a Shore D hardness less than or equal to about 50 and a flex modulus of less than or equal to about 20 kpsi.
2. The golf ball of Claim 1 wherein the cover further comprises at least one additional component selected from copolymers in the group
- 30 consisting of nonionomeric thermoplastic copolymers and dipolymeric ionomeric thermoplastic copolymers, said copolymers having a  $M_w$  of from about 80,000 to about 500,000.

3. The golf ball of Claim 2 wherein the thermoplastic composition has a Shore D hardness from about 10 to about 45.
4. The golf ball of Claim 3 wherein the composition has a Shore D hardness from about 15 to about 40.
- 5 5. The golf ball of Claim 2 wherein at least 30 % of the acid moieties of the composition are neutralized.
6. The golf ball of Claim 5 wherein at least 45 % of the acid moieties of the composition are neutralized.
7. The golf ball of Claim 2 wherein the neutralizing agent has a cation selected from the group consisting of zinc, magnesium and lithium.
- 10 8. The golf ball of Claim 6 wherein the neutralizing agent has a zinc cation.
9. The golf ball of Claim 2 wherein the composition has a flex modulus from about 3 to about 8.
- 15 10. The golf ball of Claim 2 wherein the scuff resistance is less than or equal to 2.5.
11. The golf ball of Claim 10 wherein the scuff resistance is less than or equal to 2.0.
12. A process for making a golf ball having a cover that is scuff resistant, the process comprising the steps: forming a cover over a golf ball core, wherein the cover has a scuff resistance of not greater than about 2.0 out of 5 and comprises or consists essentially of a thermoplastic composition that includes:
- 20 (a) at least one E/X/Y copolymer having a weight average molecular weight of from about 80,000 to about 500,000 obtained by the copolymerization of comonomers E, X, and Y wherein E is ethylene, X is a C<sub>3</sub> to C<sub>8</sub>  $\alpha,\beta$ -ethylenically unsaturated carboxylic acid, and Y is an alkyl acrylate or an alkyl methacrylate softening comonomer wherein the alkyl groups have from 1 to 8 carbon atoms, wherein E is present in an amount of from about 30 wt% to about 81 wt% based on the weight of the copolymer, X is present in an amount of from
- 25 30

- about 2 to about 30 wt.% of the copolymer, Y is present in an amount of from about 17 to about 40 wt.% of the copolymer;
- (b) one or more E/acrylic acid and/or E/methacrylic acid copolymers having a weight average molecular weight of from about 2,000 to about 30,000 and having from about 3 to about 20 wt.% acrylic acid and/or methacrylic acid present based on the weight of (b), the copolymer present in the composition in an amount of from about 5 to about 30 wt.% based on the combined weight of (a)+(b);
- and wherein: (1) the thermoplastic composition is at least partially neutralized by one or more alkali metal, transition metal, or alkaline earth metal cations and (2) the composition has a Shore D hardness of from about 10 to about 45 and a flex modulus of less than or equal to about 20 kpsi.
13. A one-piece golf ball having a scuff resistance not greater than about 2.0 out of 5 and comprises a thermoplastic composition that includes:
- (a) at least one E/X/Y copolymer having a weight average molecular weight of from about 80,000 to about 500,000 obtained by the copolymerization of comonomers E, X, and Y wherein E is ethylene, X is a C<sub>3</sub> to C<sub>8</sub>  $\alpha,\beta$ -ethylenically unsaturated carboxylic acid, and Y is an alkyl acrylate or an alkyl methacrylate softening comonomer wherein the alkyl groups have from 1 to 8 carbon atoms, wherein E is present in an amount of from about 30 wt% to about 81 wt% based on the weight of the copolymer, X is present in an amount of from about 2 to about 30 wt.% of the copolymer, Y is present in an amount of from about 17 to about 40 wt.% of the copolymer;
- (b) one or more E/acrylic acid and/or E/methacrylic acid copolymers having a weight average molecular weight of from about 2,000 to about 30,000 and having from about 3 to about 20 wt.% acrylic acid and/or methacrylic acid present based on the weight

of (b), the copolymer present in the composition in an amount of from about 5 to about 30 wt.% based on the combined weight of (a)+(b);

and wherein: (1) the thermoplastic composition is at least partially  
5 neutralized by one or more alkali metal, transition metal, or alkaline earth metal cations and (2) the composition has a Shore D hardness less than or equal to about 60 and a flex modulus less than or equal to about 40 kpsi.

14. The golf ball of Claim 13 wherein the composition has a  
10 Shore D hardness from about 10 to about 55.

15. The golf ball of Claim 14 wherein at least 30 % of the acid moieties of the composition are neutralized.

16. The golf ball of Claim 15 wherein at least 45 % of the acid moieties of the composition are neutralized.

15 17. The golf ball of Claim 16 wherein the neutralizing agent has a cation selected from the group consisting of zinc, magnesium and lithium.

18. The golf ball of Claim 17 wherein the neutralizing agent has a zinc cation.

20 19. The golf ball of Claim 13 wherein sufficient filler is added to adjust the mass of the golf ball to a level meeting the limits set by the golfer's governing authority.

20. The golf ball of Claim 19 wherein sufficient filler is added to adjust the mass of the golf ball to about 45 grams.

25 21. A method of making a golf ball of claim 19, comprising the steps: molding into the shape of a golf ball a thermoplastic composition comprising:

(a) at least one E/X/Y copolymer having a weight average  
molecular weight of from about 80,000 to about 500,000  
30 obtained by the copolymerization of comonomers E, X, and Y wherein E is ethylene, X is a C<sub>3</sub> to C<sub>8</sub>  $\alpha,\beta$ -ethylenically unsaturated carboxylic acid, and Y is an alkyl acrylate or an

alkyl methacrylate softening comonomer wherein the alkyl groups have from 1 to 8 carbon atoms, wherein E is present in an amount of from about 30 wt% to about 81 wt% based on the weight of the copolymer, X is present in an amount of from about 2 to about 30 wt.% of the copolymer, Y is present in an amount of from about 17 to about 40 wt.% of the copolymer;

(b) one or more E/acrylic acid and/or E/methacrylic acid copolymers having a weight average molecular weight of from about 2,000 to about 30,000 and having from about 3 to about 20 wt.% acrylic acid and/or methacrylic acid present based on the weight of (b), the copolymer present in the composition in an amount of from about 5 to about 30 wt.% based on the combined weight of (a)+(b);

and wherein: (1) the thermoplastic composition is at least partially neutralized by one or more alkali metal, transition metal, or alkaline earth metal cations; (2) the composition has a Shore D hardness of less than or equal to about 60 and a flex modulus of less than or equal to about 40 kpsi; and (3) the composition includes from about 0 to about 82 wt% filler.

22. The method of Claim 21 wherein sufficient filler is added to adjust the mass of the golf ball to a level meeting the limits set by the golfer's governing authority.